

What is Claimed is:

1. A system for guiding a device toward an object comprising:  
means for generating a guidance command signal from: a vectored line-of-sight (LOS) between a device and an object using a position parameter of the object relative to a guidance frame, and an estimated object state produced in  
5 the guidance frame using the vectored line-of-sight; and  
means for transmitting the guidance command signal to an on-board guidance control of the device.
  
2. A system for guiding a device toward an object in accordance with  
10 claim 1, wherein the means for generating a guidance command signal creates an estimated object to device range vector, an estimated object to device velocity vector and an estimated object acceleration vector.
  
3. A system for guiding a device toward an object in accordance with  
15 claim 2, wherein the means for generating a guidance command signal creates an estimated object acceleration rate vector.
  
4. A system for guiding a device toward an object in accordance with  
claim 1, wherein the means for generating a guidance command signal is  
20 periodically adaptive.

5. A system for guiding a device toward an object in accordance with  
claim 1, wherein the means for generating a guidance command signal comprises:  
5 means for generating a set of probability weights.

6. A system for guiding a device toward an object in accordance with  
claim 5, wherein the sum of the probability weights for any axis of the guidance  
frame is unity.

10 7. A system for guiding a device toward an object in accordance with  
claim 1, wherein the means for generating a guidance command signal uses  
sequential line-of-sight (LOS) vectors in the guidance frame.

15 8. A system for guiding a device toward an object in accordance with  
claim 1, wherein the means for generating a guidance command signal comprises:  
at least one Kalman filter bank.

20 9. A system for guiding a device toward an object in accordance with  
claim 8, wherein the at least one Kalman filter bank is harmonically balanced.

10. A system for guiding a device toward an object in accordance with  
claim 9, wherein each of the at least one Kalman filter bank is associated with a  
5      respective axis in the guidance frame.

11. A system for guiding a device toward an object in accordance with  
claim 1, wherein the means for generating a guidance command signal comprises:  
a proportional navigation controller.

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12. A system for guiding a device toward an object in accordance with  
claim 1, wherein the means for generating a guidance command signal comprises;  
an augmented proportional navigational controller.

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13. A system for guiding a device toward an object in accordance with  
claim 1, wherein the means for generating a guidance command signal comprises:  
a classical optimal controller.

14. A method for guiding a device toward an object comprising  
the steps of:

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creating a vectored object line-of-sight (LOS) in a guidance frame;  
producing an estimated object state, using sequential object LOS;

using proportional navigation control to create a device guidance command as a function of an estimated range vector and an estimated velocity vector obtained using the estimated object state.

15. A method for guiding a device toward an object in accordance with claim 14, wherein the estimated object state is adaptively produced.

10 16. A method for guiding a device toward an object in accordance with claim 15, comprising the steps of:

creating a periodically adaptive guidance command using estimated object state; and,

15 adding the periodically adaptive guidance command to the device guidance command.

17. A method for guiding a device toward an object according to claim 15, wherein the step of creating a device guidance command comprises the step of:

20 creating a guidance command operating on device acceleration to compensate for autopilot lag.

18. A method for guiding a device toward an object according to claim  
16, wherein the step of creating an periodically adaptive guidance command  
5 comprises the step of;

using a function of object maneuver frequencies, time-to-go before  
intercept, maneuver frequency correlation time constants, estimated target  
accelerations and estimated object acceleration rates.

10 20. A method for guiding a device toward an object in accordance with  
claim 14, wherein the step of creating a vectored object line-of-sight comprises the  
steps of:

- a) obtaining azimuth, elevation and range information of an object;
- 15 b) using the azimuth, elevation and range information for vectored LOS reconstruction to create a unit vector representative of the object's orientation in a guidance frame of the device; and,
- c) applying the range information to the output of the vectored LOS reconstruction to create the estimated range.

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21. A method for guiding a device toward an object in accordance with  
claim 20, wherein the step of producing an estimated object state comprises the  
step of:

processing plural sequential estimated range vectors into an object state estimator in an inertial guidance frame estimated object state, wherein the 5 estimated object state can include range, velocity, object acceleration and object acceleration rate.

22. A guidance system for guiding a device toward an object comprising:  
means for generating a signal representing a predicted position of  
10 the object from: object position parameters relative to a guidance frame and a periodically adaptive estimated object state produced in the guidance frame using the object position parameters; and,  
means for transmitting the signal to an on-board guidance control of the device.

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23. A guidance system for guiding a device toward an object according to claim 22, comprising:  
a fire control platform  
wherein the means for generating a signal representing the predicted  
20 position of the object is located on the fire control platform, and the fire control platform is remote from the device.

24. A method for guiding a device toward an object comprising the steps of:

5                   obtaining object position parameters;  
                  periodically adaptively producing an estimated object state;  
                  creating a predicted position from the estimated object state; and,  
                  determining a guidance command from the predicted position of the  
object.

10                25. A method for guiding a device toward an object according to claim 24  
                  comprising the steps of:

                  transmitting the predicted position of the object from a remote  
location to the device;  
                  wherein the step of determining a guidance command is performed  
15                on the device.

26. A method for guiding a device toward an object according to claim  
24, comprising the steps of;

20                obtaining device position parameters;  
                  determining at a remote location a time-to-intercept; and,  
                  transmitting the time-to-intercept from the remote location to the  
device.